

ence low temperature may be expected to have on the indications of an instrument whose action depends on a steel helical spring. The effect of temperature on such instruments is often ascertained more conveniently by trial than by calculation; but when the instrument is to be used at temperatures outside of the limits between which it has been tested, recourse must be had to calculation, usually by extrapolation from the temperatures at which tests have been made. It is always a question how far it is justifiable to carry such extrapolation; for the rate of change with temperature may be very different outside the limits within which tests have been made from what it is inside of them. The writer's experiments show that at low temperatures no very great change takes place in the manner in which the elasticity of steel depends on temperature; and that, therefore, in allowing for the effect of low temperature on an instrument whose indications depend on the action of a steel spring, it is possible to extrapolate from the results of tests at higher temperatures.

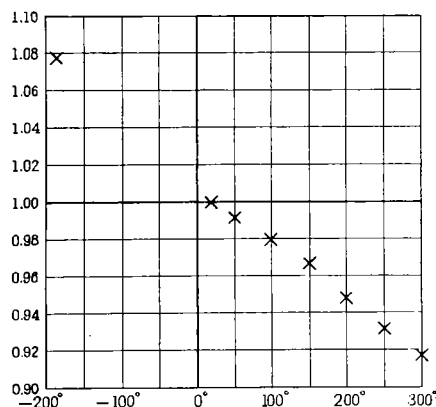


FIG. 4.—Rigidity modulus for steel, in terms of its value at 20° C. Pisati's results for high temperatures. My result for -186° C.

#### THERMOMETRIC OBSERVATIONS AT SANTA FE, ON THE ISLE OF PINES.

Communicated by E. W. KELLOGG, M. D.

*Isle of Pines temperatures during December, 1902.*

[Observed with a spirit thermometer.\*]

December.	6 a. m.	Noon.	9 p. m.	Weather.	December.	6 a. m.	Noon.	9 p. m.	Weather.
1..	74	86	76	Clear.	17..	74	83	75	Clear.
2..	74	87	76	Clear.	18..	72	80	72	Clear.
3..	74	86	76	Clear.	19..	70	79	69	Clear.
4..	76	88	78	Light showers.	20..	71	80	72	Clear.
5..	76	81	76	Partly cloudy.	21..	70	80	72	Clear.
6..	74	82	76	Clear.	22..	65	80	74	Clear.
7..	76	82	76	Clear.	23..	65	75	70	Clear.
8..	72	78	72	Clear.	24..	65	71	68	Clear.
9..	76	80	74	Partly cloudy and clear.	25..	64	70	70	Partly cloudy.
10..	72	81	76	Clear.	26..	69	72	68	Clear.
11..	74	80	76	Light thundershower.	27..	60	73	66	Clear.
12..	72	83	78	Clear.	28..	58	72	67	Clear.
13..	76	85	76	Clear.	29..	67	78	71	Clear.
14..	76	83	76	Clear.	30..	70	78	71	Shower and clear.
15..	75	82	74	Clear.	31..	72	82	72	Clear.
16..	74	83	76	Clear.					

\* Nothing is at present known of the accuracy of this spirit thermometer, but it is hoped that the observer will eventually provide a reliable mercurial thermometer and make the necessary comparative readings.—C. A.

#### VIOLENT WIND IN SOUTH DAKOTA.

By S. W. GLENN, Local Forecast Official, dated Huron, January 15, 1903.

The wind, which was from the northwest, attained a maximum velocity of 48 miles per hour; a special observation was taken at 2:40 p. m. of the 6th and sent to the district forecast center. Because of an increase in pressure of .12 inch in two hours, another was taken at 5:20 p. m. and sent; and at

6:20 p. m. another was sent because of a 64-mile per hour wind and a possibility of no wires being available for the regular p. m. report. It was only through the courtesy of the train dispatcher of the Chicago & Northwestern Railway, who had an outlet for about five minutes, that the p. m. report got off.

The a. m. report of the 7th was promptly filed, but it was later learned that it did not get off in time for the St. Paul circuit, so was sent by mail with an explanation relative thereto. There was practically no outlet by wire from the time that the p. m. report of the 6th was sent until the late afternoon of the 7th, due to the wires being down, or in trouble.

On the 7th as soon as a wire was available, a special observation was taken and sent to Chicago, showing the conditions from 8 a. m. up to that time.

After 2:20 p. m. of the 6th the wind steadily increased, with occasionally some abatement for short periods, until about 10:45 p. m. when it attained a maximum velocity of 72 miles per hour, after which time it very slowly diminished, though it continued high most of the 7th.

A number of clippings relative to the storm have already been forwarded, but those applying to Huron and the vicinity are somewhat exaggerated. A portion of the flat tin roof of the Presbyterian College, a four-story structure, was torn away about two hours before the maximum wind velocity occurred, taking with it a portion of the brick coping that was in poor repair, and a portion of the debris knocked down a chimney of a near-by church and also of a residence. Several out-of-repair chimneys were blown down or damaged, and some loose and exposed outhouses were blown over. The south gable of an old one-story building was blown out, due to a draft from an opening on the north side. The roof of the college was a weak affair, and I am informed the wind had access below and under the roof from a broken window.

Farmers in the county report some wind mills with old wooden supports blown down, and hay stacks uncovered.

The Chicago & Northwestern Railway train service was greatly interrupted by the storm, due to snow blowing into the cuts.

In the county adjoining on the east, two men and some animals were reported killed by a shelter being blown in.

The Weather Bureau instrument shelter is fully exposed to the force of the wind from all directions, but the thermograph trace during the storm does not show a very marked vibration.

Fortunately, there was no snow during the storm of any consequence, and the temperature was comparatively moderate during the gale.

The maximum velocity during the storm exceeded by three miles the highest ever before recorded at the station, which was 69 miles per hour in June, 1894, but the wind has equaled or exceeded 60 miles per hour in 21 previous storms.

The total movement from noon of the 6th to noon of the 7th was 1000 miles, or an average of 41.7 miles per hour.

#### THE VERTICAL COMPONENT OF THE MOVEMENT OF CLOUDS MEASURED BY THE NEPHOSCOPE.

By LOUIS BESSON, translated from the *Annuaire, Société, Météorologique de France*, 1902, pp. 180-185.

In order to determine by means of a nephoscope the movement of a layer of clouds, it is usually considered sufficient to observe the direction of these from a point in the sky chosen arbitrarily. This is to admit implicitly that—omitting all accidental deviations—the same result would be found at any other point in the sky.

This, however, is not the case. The observations made at Montsouris show that in general the apparent direction of the motion of the clouds varies from one point in the sky to another and that the differences frequently attain a rhumb (22.5°), and even much more. In the great majority of cases the clouds seem to vary from one side to the other of their mean direction.